REMARKS

Claims 1-30 are pending in the application. Claims 14-19, 23, 26, and 28-30 are withdrawn from consideration. Claims 1-13, 20-22, 24, 25, and 27 are rejected.

In the Office Action, the Examiner renumbered claims 9-31 as claims 8-30. The renumbered claims are provided above.

Claims 1, 12, 20, 22, and 25 stand rejected pursuant to 35 U.S.C. §102(b) as being anticipated by Iseki et al. (JP 02209135 Abstract). Claim 21 stands rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Iseki et al. further in view of Yamaguchi et al. (U.S. Patent No. 4,631,710). Claims 1-13, 20-22, 25, and 27 stand rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Yamaguchi et al. alone or further in view of Iseki et al.

Claims 1, 13, 24 and 27 have been amended. Withdrawn claims 15-19, 23, 26, 29, and 30 have been amended. New claims 31 and 32 have been added. Applicants respectfully request reconsideration of claims 1-13, 20-22, 24, 25, 27, 31, and 32 including independent claims 1, 22, 25, and 31.

Independent claim 1 claims determining a grating lobe level and altering processing in response to the grating lobe level. Applicants respectfully submit that Iseki et al. do not disclose these limitations. Iseki et al. receive the same signals over a receive aperture, but provide different preamplifiers 2, focus control 3, log amplifiers 4, and ADC converters 5 in two receive paths (abstract; Figure 1) to signals from two subapertures. The receive path associated with a least likely grating lobe contribution is then selected and output (abstract). The data from the receive path with the lowest amplitude is selected and output (abstract). Iseki et al. use an aperture process with two receive subapertures (Figure 1and 2). Each receive subaperture has an associated receive path. The left and right halves of a full-aperture delay profile are applied to a left and right subaperture, respectively (Fig 3). As a result, the subapertures have the same main lobe angle but different grating lobe angles that are symmetrical around the main lobe angle (Figures 4 and 5). The output of each receive path includes signal from the main lobe and clutter from its respective grating lobe. The grating lobe components of the path outputs may differ if the echogenicity of the object is different between the grating lobes. The signal component of the path outputs may also differ if the propagation paths from the subapertures to the focal point have different levels of tissue aberration (amplitude and/or delay aberration) or if the object in the main lobe is anisotropic, i.e., more

echogenic in one direction than the other. The output with the least amplitude is then selected. Iseki et al. do not suggest determining a grating lobe level, but instead provide two separate paths.

Applicants respectfully submit that Yamaguchi et al. do not disclose determining a grating lobe level and altering processing in response to the grating lobe level. Yamaguchi et al. prevent grating lobe clutter (Col. 4, lines 18-20). As a beam is steered sideways, the frequency content of the received signal is altered (Col. 2, lines 25-30). The frequency response of a filter is varied as a function of azimuth beam angle (Col. 2, lines 64-68; Col. 3, lines 27-33 and Col. 4, lines 11-20). Yamaguchi et al. prevent grating lobes by altering frequency response as a function of a steering angle. Yamaguchi et al. do not determine a grating lobe level and do not alter processing in response to the grating lobe level.

Both Iseki et al. and Yamaguchi et al. fail to disclose the claimed limitations. Applicants respectfully submit that a person of ordinary skill in the art, using both teachings, would not have determined a grating lobe level and altered processing in response to the grating lobe levels.

Independent claim 22 claims a processor operable to determine a level of grating lobe clutter and to alter processing in response to the level of grating lobe clutter. As discussed above, Iseki et al. and Yamaguchi et al. do not disclose these limitations.

Independent claim 25 claims measuring a level of grating lobe energy from received ultrasound data and adapting data processes to reduce the level of grating lobe energy in the received ultrasound data. Iseki et al. merely generate two possible samples from two different receive paths and select a lowest amplitude sample, and thus do not measure a level of grating lobe clutter. Yamaguchi et al. prevent grating lobe clutter by altering the receive frequency as a function of scan angle, and thus also do not measure a level of grating lobe clutter.

Dependent claims 2-13, 20, 21, 24, and 27 depend from independent claims 1, 22, and 25, and are thus allowable for at least the same reasons discussed above. Further limitations of the dependent claims distinguish from Iseki et al. and Yamaguchi et al. For example, claims 2-12 and 27 claim determining the grating lobe level as a function of filter input and output. Yamaguchi changes a filter response based on angle to prevent grating lobe clutter, not to determine a level. Comparing ghosting with or without the prevention of Yamaguchi et al. would not have been performed with a processor or automatically. The comparison suggested by the Examiner is a manual switching. As another example, a difference as claimed in claim 5 or a ratio as claimed in claim 6 would not have been obvious since Yamaguchi et al. fails to even suggest determining a

grating lobe level with a processor. As another example, the weighted summation of claim 7-9 is not suggested. Yamaguchi et al. alter the frequency response of input data, but do not combine the filter input with the filter output. Yamaguchi et al. vary the frequency response, but do not disclosure use of 0 or 1 extremes. As yet another example, Yamaguchi et al. do not disclose determining an amount of grating lobe energy as claimed in claim 21.

New claims 31 and 32 are also distinguished over Iseki et al. and Yamaguchi et al. Iseki et al. use an aperture process to reduce grating lobe energy. Applicants respectfully submit that there is no suggestion to adapt an axial process to reduce grating lobe energy.

The withdrawn claims depend from independent claims that are allowable and broad enough to encompass the withdrawn claims. Accordingly, upon allowance, the Examiner is requested to also allow the withdrawn claims as well as amend by Examiner's amendment any dependencies of the withdrawn claims in accordance with the renumbering of the claims. Applicants have also amended withdrawn claims 15-19, 23, 26, 29, and 30 to correct the claim dependencies in accordance with the renumbering of the claims by the Examiner.

CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7350 or Craig Summerfield at (312) 321-4726.

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